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Exploring the Role of Syntactic Information on User Behavior in Online Social Platforms

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EXPLORING THE ROLE OF SYNTACTIC INFORMATION ON USER BEHAVIOR IN ONLINE SOCIAL PLATFORMS

Completed Research Paper

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Abstract

The proliferation of information technologies, applications and online services has changed the way users access information. In particular, an increasing amount of users engage with online social platforms on a daily basis where they are exposed to a continuous stream of information. A great deal of this information is available through numbers and numbers as self-representative visualisations such as likes, views, shares, endorsements and diggs, which sparked an interest in its role in influencing users. This study thus explores the role of syntactic information on user behaviour in online social platforms. The investigation introduces a taxonomy based on four categories (push, pull, personal, and public) as a possible departure point for discussion. The results suggested that users are particularly interested and motivated by personally attributed syntactical information and claim to dismiss the equivalent of public information. Nevertheless, it became clear that public syntactic information was still unconsciously processed and applied as a measure or benchmark on the online social content.

Keywords: User behaviour, User adoption, Social networking sites, Social media, Syntactic information, Quantified self, Gamification

Introduction

The dispersion of information technologies has changed the way people access and process information online. The perpetual availability of information presents thrilling possibilities but also poses challenges for users' information processing abilities such as coping with data overload (Bawden and Robinson, 2009). Users are in danger of data overload when entering a social platform, where they are often exposed to syntactic information in the form of likes, views, shares, endorsements and diggs, but also semantic information, such as tweets, status updates, blog posts. This paper will focus on syntactic information, or numbers as symbols for social interaction in online social platforms. The use and importance of syntactic information can easily be traced in both online and offline activities, as companies measure profit, physicians measure blood pressure and athletes measure performance. However, while such performance measures are common practice, new information technology, such as wearable technology, has introduced novel ways of measuring personal performance. As such, the pursuit of measuring performance is done in several domains, like social interaction, fitness, mood, productivity and such ubiquitous access to enabling technology simplifies the data collection process for enthusiastic users in a way that was not previously possible. The data extracted in self-monitoring purpose often revolves around personal data, yet users are often also subjected to other users' data, namely public data through their online feeds. Thus, this study explores the role of personal and public data showcased as syntactic information in online platforms, with an overall aim of attempting to understand how it may influence user behaviour.

Research on the influence of syntactic information is a novel area of investigation as user behaviour. There is much potential in academia as this topic poses questions on how information technology has influenced individual information process by the introduction of new instruments and tools. Current research often revolves around engagement and satisfaction. Krasnova et al. (2011) pinpointed that users will persist if they feel involvement based on determinants such as belongingness and esteem needs together with peer pressure. Langerak et al. (2003) presented satisfaction with member-to-member interaction as a significant driver. On the other hand, Hargittai et al. (2010) study on user behaviour and the perception of content credibility suggested that social validation matter more than exercising a source evaluation on online information.

As a result, the interest lies in exploring a novel perspective on user engagement and user evaluation by focusing on the role of syntactic information in online social platforms. The investigation departs from the overarching research question: how does syntactic information in online social platforms influence reactions and behaviour of users? However, the purpose of this paper is to investigate the topic's foundation from which main themes will be derived and guide future discussion. The building blocks will be established by identifying themes on how syntactic information appears, attributes, and invoke behaviour in users of an online social platform. The themes will further inform the drafting of a taxonomy and hopefully serve forthcoming research. At this point, the investigation will mainly focus on online social platforms, such as but not limited to, social networking sites (SNS) with gamification features such as Facebook, Instagram, and LinkedIn as well as quantified self technologies such as MoodScope, Fitocracy and RunKeeper.

The paper is organised as follow. Firstly, the context of syntactic information and supporting pillars is introduced. Subsequently, the empirical setting is presented and followed by a discussion that outlines a taxonomy of the variations of syntactic information, which may influence user behaviour on online social platforms and related applications.

Background

A general, but for this setting, applicable and relevant understanding of information will be introduced, followed by a distinction between syntactic and semantic. Lastly, syntactic information is further discussed by describing the pillars upon which it rests, namely push respectively pull.

Information: Syntactic versus Semantic

Machlup (1983) defines information as a flow of messages or meanings that provide addition or change to knowledge. Information also has the ability to introduce signals that can eventually lead to knowledge, depending on the beliefs of the person that receives the information (Dretske, 1981). Information can furthermore be divided into a syntactic respectively a semantic approach (Shannon and Weaver, 1949). The syntactic approach poses that information is made of measures, without regard to meaning or value (Shannon and Weaver, 1949). The distinction between syntactic and semantic commonly uses the example of a telephone bill: the invoice will calculate the duration (number of minutes) rather than content of the conversation. In other words, the syntactic approach focuses on structure, i.e. duration, whereas the semantic approach focus on meaning, i.e. the content of the conversation. The syntactic approach is also concerned with the form, signs and symbols that are conveyed with the aim of ensuring accurate communication and a quality information exchange between sender and receiver, despite potential boundaries (Carlile, 2002). In this research context, syntactic information may be design features such as likes, views, shares, endorsements, diggs up and down, friends, and followers. When a user chooses to interact with these interface features, regardless of the, the interactions are converted and aggregated into syntactic information. In this sense, the aggregated numbers are numerical representations of social interactions. As online users are having difficulties in coping with info processing and setting expectations for performance (Bawden and Robinson, 2002; Au et al., 2009), this paper then argues that the syntactic information works in the favour of the user's decision-making process, as it provides a mental shortcut.

Two Pillars of Syntactic Information

Syntactic information appears in an online platform through push or pull activity, which may overlap at times. The distinction between push and pull activity is important as it suggests that it may affect the user reactions and any potential subsequent behaviour in different ways.

A push of syntactic information is driven to a passive user in an online social interface. In this scenario, the user has no control over the syntactic information and cannot reduce the data, i.e. cannot delete individual likes attributed to an Instagram post or delete endorsements on LinkedIn, without deleting the post itself. The push feature stems from gamification, namely the use of game design elements in a non-game context, and is commonly incorporated into online interfaces to influence users behaviour (Deterding et al., 2011). The push of syntactic information can also be referred to as pointification, which is one of the most common of gamification principles (Robertson, 2012). Pointification allows the user to collect points throughout the play. Examples of push will be discussed in reference to Facebook, LinkedIn, and Instagram.

A pull of syntactic information involves the user to a greater extent as he is active in pulling data (often about himself) followed by entering it in an online social platform and potentially sharing it online. The pull function derives from the movement Quantified Self (QS) that promotes measuring various aspects of life for the purpose of self-knowledge through numbers (Quantified Self, 2013). Self-quantification has gained ground with the increasing accessibility to sensor technologies & social phenomena (Swan, 2012). Examples used will be Moodscope, a mood tracking community, Fitocracy, a health community, and RunKeeper, a running application.

Research Approach

This study attempts to outline a framework for discussing the role of syntactic information in online social platforms. The research approach wishes to identify the major themes on how syntactic information appears and is perceived by users by collecting data from focus groups. Two focus groups of a varied demography were gathered with the purpose of gathering in-depth and additional perspectives (Krueger and Casey, 2000). The 14 participants were equally many men and women, born between the 1970s and 1990s, and included expert and novel users of online social platforms. Occupation ranged from being university students, self-employed, private respectively public sector. The focus groups were invited and asked to discuss how they perceived their usage on a variety of online social platforms and related

applications. The two sessions were conducted in the same manner, where online social platforms, such as Facebook, LinkedIn, Instagram, Twitter and TripAdvisor were projected onto a large screen followed by open questions on what participants noticed and how they interacted with the interface. Subsequently, more specific questions were asked regarding features such as received and given likes, endorsement and followers.

There were obvious limitations to this study, such as the small sample and the very individual and varied nature of answers in online behaviour. As such, this study acknowledges that individuals differ vastly in online navigation patterns, so the intention is to discuss ideal situations that reflects the focus group participants perceptions and impression of events (Rossi and Nock, 1982). Notably, participants answers also varied depending on whether direct questions from the facilitator were asked or open group discussion were held. In order to strengthen the methodological approach, future research should benefit greatly from in-depth interviews with individuals as well as observation in a natural setting in uncovering user practices that are complicated to capture through the current method.

Preliminary Findings

The preliminary findings from the focus groups gave insight into the navigation patterns of online social platform users and within this data, several recurring scenarios were addressed, which were beneficial for identifying the main themes of syntactic information's role on user behaviour in online social platforms.

The starting point for navigation to a preferred platform is often based on curiosity induced by a reaction to notifications received via a mobile phone application or email. Indeed, notifications are push functions and an essential part of the online social experience and influences engagement (Claussen et al., 2013). When the user has entered the platform, he will review, react and potentially interact with the notification(s), followed by quickly viewing the top stories in the newsfeed. The user then continues scrolling the newsfeed, with the main task of scanning but also possibly reacting to and interacting with content. Any personal pull of data (e.g. posting an update) generally occurs after the initial information processing, unless a post is the initial intention. The behaviour is largely based on learnt habitual patterns, such as directly reviewing and reacting to any potential notifications followed by quickly scanning the content of the newsfeed. Focus group participants described the scanning as an attempt to get an overview and simplifying the information available. The above procedure is repeated several times a day, and for a majority of the focus group, the procedure is even repeated several times an hour. Figure 1 is used to illustrate how general information is narrowed down to four types of syntactic information.

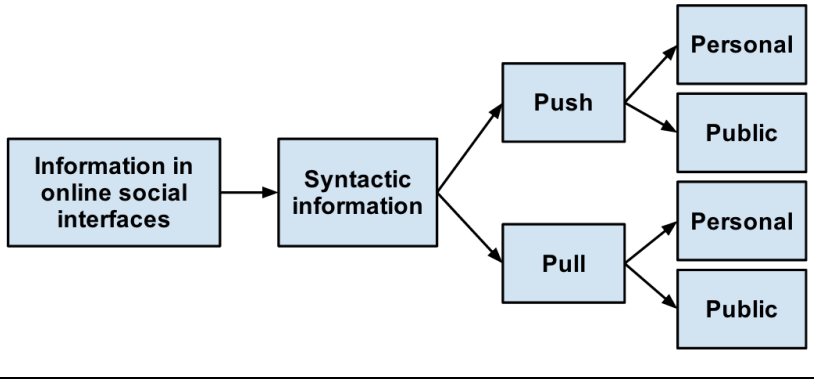

Figure 1. Four types of syntactic information

The focus group discussion further enabled and cemented the identification of four main themes of user behaviour, namely push, pull, personal and public. The following section will elaborate on how the main themes were uncovered in focus group discussion on reactions and behaviour. The results are presented in the taxonomy below (Table 1).

Firstly, the inability to process information on social platforms that were lacking syntactic information was perceived as frustrating. Focus group participants argued that the inability to quickly, if not immediately, evaluate the content on a site would lead to switching to new page rather than attempting to decipher the content. Accordingly, users attempt like to stick to habitual pattern and as soon as they are unable to extract the data they are used to, they move along. Any altered attempt to process the content of a page often started by scanning the semantic information, yet quickly shifted to reviewing syntactic information. This indicates that public syntactic information is used to guide behaviour and evaluate the content and whether to engage. For example, not many of the participants enjoyed using Twitter because it was "overwhelming with information" and had few cues for quality evaluation, which resulted in users leaving the site due to the inability to evaluate the content. On the other hand, Google+ was a rarely used platform yet the same participants praised the implementation of syntactic information, such as +1s, as it helped them navigate the content. This finding suggests that semantic information may be unfavourable to understanding public content, while syntactic information helped users to evaluate the public content.

The second finding showcased that the user will both consciously and unconsciously evaluate numbers attributed to content in online social platforms. Overall, participants agreed that interface features, such as numbers, simplified the habitual scanning process that occurs upon entering a new webpage. For example, while visiting YouTube, participants agreed that they review the number of views as an indicator for quality and decide whether they will view the video based on this number. However, the number of pushed thumbs up or downs showcased in the YouTube video comment section will not initially influence the decision to watch, but may have a subsequent influence on the evaluation of the content of the video. In the case of personal video content, the user would evaluate the views and thumbs ups/downs as a part of personal success. Although, the focus group participants stated that they did not always associate a high number of views, likes, followers with high quality, but it did indirectly grab the attention upon which they resorted to a decision to interact or not. This finding concludes that the influence of syntactic information on conscious and unconscious behaviour will vary depending on platform, placement and context as well as personal or public content.

The third finding suggested that the user is primed with a number by which he evaluates personal success of e.g. a Facebook post. The number for a personal favourable outcome is often primed by earlier experiences and to a certain degree by the numbers attributed to peers, or in other words, the public information in the newsfeed. This behaviour is also known as anchoring, which entails that choices are determined by historical accident or manipulations (Ariely et al., 2005), and in this case, it could be triggered by a previously collected number or numbers given to peers. In other words, individuals are prone to revert to the anchored number to evaluate self-performance. For instance, all of the focus group participants were able to recall the highest number of likes that they had received across several platforms, such as Facebook, Fitocracy, Instagram, RunKeeper and YouTube, which suggests that a high number of exhibits value to the user. However, they underlined that a personal number was not consciously pursued when posting a Facebook update but remained a benchmark for evaluating success of the post. Participants also expressed that they felt a sense of entitlement to a certain amount of likes in circumstances, like birthdays, giving birth or getting a new job. Nevertheless, such personally attributed syntactic information is evaluated differently than the equivalent public syntactic information. The finding suggests that the user indeed anchors a number to evaluate success of online social platform activity, which strongly suggests that syntactic information influences user behaviour.

Fourthly, strategies and tools to increase personal syntactic information is common and cements that there is value to a high number, such as likes, points, Instagram hearts, followers or diggs that are not "bought" or "strategically generated". For instance, the user may adopt tools and strategies, such as the use hashtags, to obtain higher numbers of personal syntactic information. In such an event, hashtags are commonly described as a helpful feature that aids in finding the relevant information (Naaman and Gravano, 2011). Yet, instead of being described as a helpful feature, focus group participants described hashtags as annoying, synonymous with hoarding likes, views, and followers, and seldom adding value to the post. The participants argued and agreed that hashtags were most commonly a means of expanding and exploiting the online social platform, for potential self-exposure. For instance, if a user includes several hashtags in a post and subsequently receives many likes, hearts or diggs, the acquired number would potentially be dismissed as obscured and undeserved. Notably, it seems as though the user will pay attention to and evaluate public syntactic information that contains strategic hashtags. On the other hand, several participants confessed that a high number is gratifying which leads them to cheat. For example,

users would add hashtags such as #tagforlikes, #tagforatag, #followforafollow as an attempt to influence personal syntactic information displayed in a public feed, yet dismissed other users' adoption of the same tactics. There are also tools, such as the widely popular mobile application InstLike (Priori data, 2013). Instlike is a game where users give Instagram-hearts to a random set of Instagram pictures and get coins in return. The coins can then be spent on retrieving likes for personal Instagram pictures, resulting in pushing personal syntactic information into a higher number. Finally, another example of obscuring pulled data can be found in the fitness app, Fitocracy, where the user logs exercises under false pretences in order to attain a high user score. As a result, users are seemingly willing to adopt behaviour in favour of increasing personal syntactic information, while denouncing the same behaviour in publicly displayed syntactic information.

The findings propose that syntactic information did play a role in influencing user behaviour, yet the behaviour varied depending on whether it was personal or public information. Personal information was more often consciously pursued, collected and noticed whereas public information was less consciously perceived yet used to evaluate content. Information overload also caused behavioural change, such as heightened attention to syntactic information to evaluate the public content. In line with these findings, the taxonomy will be based on four themes: pushed, pulled, personal and public information.

Towards a Taxonomy of the Influence of Syntactic Information on Users

The following discussion outlines such a potential influence by discussing four themes either uncovered or supported in the findings, namely push, pull, personal and public.. The distinction is important as the themes involve different functions and inspire various behaviour, while they still might involve the same online social features, such as likes, shares, endorsements, diggs, views, followers and friends. Four types of syntactic information is presented in Table 1.

The first category describes how syntactic information appears in the online platform (i.e. push or pull) respectively to who it is attributed (i.e. myself/personal or others/public). The push function ascribes syntactic information to a passive user, who has little or no control of the process. The pull function involves the user as an active part in control of pulling and collecting self-data that transferred to an online platform and potentially shared with the remaining network. The second main distinction is personal versus public, which describes to who the syntactic information is attributed in an online social platform. Personal syntactic information is attributed to a single user (i.e. myself), whereas public syntactic information is the content of the remaining network (i.e. others in my network). Table 1 further elaborates on this through a taxonomy.

Table 1. Types of syntactic information in online social platforms

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	PERSONAL	PUBLIC
PUSH Active	**Allocation** - Syntactic information attributed to a single user by other users - Reactions are followed by behaviour - The user cannot control data - Examples: Likes; Shares; Endorsements; Views	**Approximation** - Syntactic information attributed to other users in a public feed - Reactions are followed by potential behaviour - The user cannot control data, only filter newsfeed - Examples: Number of friends attributed to other users; Endorsements attributed to other users

PULL Passive	**Personalisation** - Syntactic information pulled by single user and attributed to self - The user controls the pull of data - Behaviour precedes reactions - Examples: Scores in Moodscope; Miles run with RunKeeper; Points in Fitocracy	**Melting pot** - Syntactic information pulled by user and attributed to the self yet public in a feed - The user cannot control data, only filter newsfeed - Behaviour precede reactions - Examples: Scores in Moodscope attributed to others; Miles run in RunKeeper attributed to others

Allocation

The push of personal syntactic information is the act of allocating something to a passive user through features such as notifications, views, likes, shares, and endorsements in an online social platform. By system default, the user cannot control the allocation of such numerical representations, i.e. LinkedIn endorsements cannot be deleted from a profile. Commonly, the user receives notifications of such a personal push by email, mobile or by entering the online social platform without prior announcement. Such notifications are generally described as interesting and a higher potential of engaging in activity. It also influenced other behaviour, such as repeatedly checking and answering incoming notifications. For example, as the user logs in, the initial task is to immediately check the personal push notifications. If the notification contains pushed public information without a personal overlap, the user is less inclined to engage. Allocation intends to cause a reaction from the user, which is followed by behaviour, such as interacting with the content. However, while the user may not always interact with pushed content, he may evaluate it for other purposes.

Participants explained that posting updates is not necessarily caused by the desire to collect pushed personal data, such as likes or views, yet the feedback caused a strong reaction such as encouragement, motivation and even as a measure of the update itself. Nevertheless, participants established that they primarily post in online social platforms where they have a comparatively larger network as it increases chances of achieving a higher degree of feedback. As a result, networks with fewer connections often meant less syntactic feedback, which in turn left the user less motivated to use such online social platforms.

In sum, the user found the push personal information as highly interesting but he does not actively seek to collect syntactic information.

Approximation

The push of public syntactic information is adopted by the user as an approximation of the content that is attributed to other users, such as likes and shares of other users' posts, endorsements or ratings. Participants describe the reactions regarding public push as minimal, yet elaborate discussion uncovered that it is still unconsciously processed and evaluated. However, it fuels less behavioural change than the personal push.

The participants explained that they would react to a high number of likes or shares in terms of attention, but it were not necessarily enough to influence interaction. The syntactic information may also fuel, but not conclude, the notion that a post was of high quality. Furthermore, in the case of a particularly high accumulation of syntactic information, participants argued that this stifled the motivation to interact, by arguing that any added contribution would not impact the person. Others argued that a high number would induce the opposite and that they felt more comfortable with interacting due to the added degree of anonymity. The focus group also expressed annoyance over receiving notifications that did not involve them, such public pushed syntactic information. For example, if a user has commented on a post, the user automatically becomes a subscriber and will be pushed notifications in case the post receives more

feedback, despite that it might not involve them. In such cases, the participants agreed that they would unfollow the post. This is opposite to the above example.

In sum, the user found public syntactic information less interesting than personal syntactic information, yet it was still processed and applied as an approximation in evaluating the content of the newsfeed.

Personalisation

The user is active and personalises the content by pulling personal data which in turn is converted by an online interface and may subsequently be shared. For example, the user can enter data about completed gym exercises and thus receive points through Fitocracy, or answer questions about the general mood to receive a moodscore on Moodscope. If the data is shared, syntactic information can be pushed. In other words, this type of syntactic information is self-collected data that is exposed in an online social platform that the user is willing to share. The user is highly aware and interested in this category of syntactic information followed by the argument that it is reflection of self, self-knowledge but mostly "just for fun". In difference to above categories, the behaviour precedes the reaction: the data collection is the behaviour upon which any potential reactions are based.

Feedback on the self-collected data, such as receiving pushed syntactic information, was described as encouraging but not the main reason for this activity. For example, when a user had used Fitocracy and logged a workout, the user deem the toughness as well as success of the session on the number of points they received, rather than turning to a physical and emotional evaluation. In sum, focus group participants argued the activity to be anything from exhibitionistic to a means to be held accountable of the self.

In sum, the user pulls personal data that may be shared on an online social platform, yet the data extraction is the often the main focus, rather than sharing it with other users.

Melting pot

The public pull of syntactic information is understood as a melting pot since the content may derive from dispersed sources, yet appears as more homogenous by adoption a syntactical expression. For example, two users attain 72% as a Moodscope score and this is showcased on the platform as identical expressions, yet the individual moods are likely to be based on entirely differently factors. The self-collected data is utterly personal and will only exist if the user actively collects the data, enters it into the system and shares it. Additional examples are points from Fitocracy or miles run with RunKeeper posted on the respective platform or on other social networks, like Facebook. This self-collected data is personal to other users, but public to the remaining social network, who are available to give pushed feedback.

The public pull of syntactic information does not spark much interest of the single user, unless it is in a specific community setting where such data is shared, like Fitocracy. For example, a moderately sporty user might aspire for the results of extremely sporty users and thus actively follow them. However, in many online social platforms, the public pull data is perceived in the same manner as public pushed syntactic information, namely with little active interest yet with much unconscious benefit.

In sum, the user is largely unaware or uninterested in syntactic information that other users actively pulled and attributed in an online social platform, yet it is still processed and used as evaluation of other users.

Conclusion

This paper sought to explore the role and influence of syntactic information on user behaviour in online social platforms. The preliminary findings from two focus groups and a subsequent categorization propose that syntactic information indeed has a substantial yet varied influence on user reactions and behaviour, in all of the themes: push, pull, personal or public approach. The themes informed a taxonomy that identified four types of syntactic information: allocation, approximation, personalisation and melting pot. Unsurprisingly, the user is highly aware and interested in personally attributed syntactic information yet due to the lack of adequate data, little was revealed about how this may influence behaviour and future

decisions, which serves it as a possibility research opportunity. Moreover, the user was less interested in the equivalent of public information, yet still seemed to use this as a benchmark against his own data collection. Nevertheless, while the public syntactic information is clearly unconsciously evaluated, it may still spur reactions and behavioural change that would be interesting to study. Finally, regardless of the influence of behaviour, syntactic information seems to aid the user in avoiding information overload by providing shortcuts to valuable pieces of information. Syntactic information thus operates as mental short cuts and provides choice sets by which users can make their decisions (Ariely et al., 2005).

The possibilities for future research are manifold and exciting. At the outset, the taxonomy would benefit from additional data collected from a natural setting, such as observing user interaction in SNS, with the aspiration of investigating how passive respectively active information is converted into interactions from the users' hand. Further, many of the behaviours discussed were potentially related to syntactic information suggests that it might be relevant to study heuristics, treadmill effect and anchoring in relation to the user's decision-making process. Moreover, it would be interesting to ask how syntactic information influences self-evaluation and subsequent self-perception. The increased attention to syntactic information might be supplementing other mechanisms, such as intuition for the favour of a number. For example, if a user measures his mood every day, is he then informing the tool or will he adopt the pushed information as truth? Dow does this affect his decision-making? Indeed, the role of syntactic information opens up a novel area of investigation of how information technology has influenced user adoption and there is a vast array for future investigation.

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